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## Spot Observation: An Introduction and Examination

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Spot observations have been used in a number of studies to measure aspects of culture as independent variables predicting performance on cognitive tests. I used spot observations in the Guatemalan highlands to determine the children's everyday activities, expecting that they would predict the children's memory-test performance.

The effort to "unpack" (Whiting, 1975) culture as a predictor variable in cognitive research derives from earlier work that related culture and personality (Whiting and Whiting, 1975). These authors present a model in which the ecology of a people determines their maintenance system, which leads to various child-rearing practices that, in turn, produce different personalities in children. The studies concentrating on cognition (e.g., Kagan, et al., in preparation; Munroe and Munroe, 1971b; Nerlove, et al., 1971, 1974; Rogoff, 1977) simply substitute cognitive differences for personality differences in this or similar models. The cognitive enterprise assumes that there is such a thing as cognitive ability, a property of individuals that varies in amount as a function of experience (stimulation, etc.) and maturation.

One finding of the Six-Culture study (Whiting and Whiting, 1975) was that personality characteristics of the children did not seem particularly stable within individuals. Rather, the behavior seemed to be a function of the "target" of interaction. Children did not strongly show "nurturance" in general or "aggressiveness" across all situations; rather, children were nurturant in the presence of infants but not in the presence of adults; aggressive in the company of same-age peers; etc.

This lesson—that personality is not so much a personal as a situational characteristic—may also be applied to the study of cognition. It may be that people don't have *more* or *less* cognitive ability, but that they apply their problem-solving skills to different tasks. Differences in amount of cognitive powers would appear when a person is transferred from familiar to unfamiliar tasks. When I began my spot

observation study attempting to unpack cultural influences on memory ability, I was not aware that I had assumed that people have different amounts of general cognitive power. However, the plan of the study makes sense only if such an assumption is made. In retrospect, I am not certain that the assumption is justified.

Before discussing the outcome of the study that investigated children's activities and memory-test performance, I should describe the method of spot observation and compare it to the collection of data by interview and by more extended observation. Then I will describe the culture and cognition study using spots, and some other uses for spot observations in investigating the social ecology.

### THE METHOD

Spot observation is a modified time-sampling method of observation in which the observer is relatively unobtrusive, taking a "mental snapshot" of the activity that is going on before his or her presence is discovered (Draper, 1975; Johnson, 1973; Munroe and Munroe, 1975). In this glance, the observer ascertains ongoing activity and the location of the target person, plus the degree to which nearby persons are involved. In many studies, the observer amplifies the observation glance by asking questions of the people present (e.g., inquiring about the location of the infant's mother if she is not present, or asking whether an older child had been directed to do the observed activity).

To make comparisons between two or more populations, the observations must be carried out very systematically. The interest may be in understanding variations between the activities of people of different ages or sexes (Draper, 1975; Johnson, 1973; Kagan, et al., in preparation; Munroe and Munroe, 1971b; Nerlove, et al., 1971; Rogoff, 1978; Whiting and Edwards, in preparation); from different cultures (Kagan, et al. *ibid.*; Nerlove, et al., *ibid.*; Whiting and Edwards, in preparation); from the same culture but varying in family characteristics, such as household density or modernization (Munroe and Munroe, 1971a; Rogoff, 1977; Whiting and Edwards, *ibid.*); or in performance on psychological tests (Munroe and Munroe, 1971b, 1975; Nerlove, et al., 1971, 1974; Rogoff, *ibid.*). Comparative spot obser-

vations must be done over an extended period, with each person observed equally during different times of the day and days of the week. In order to escape the effects of daily and weekly cycles, enough observations must be made to insure that differences reflect variations between the populations and not merely random fluctuation due to the variability usual in people's activities.

In comparing the behavior of different groups across settings, the investigator must be careful to take differential participation in various settings into account. For example, if one group attends school more commonly than another, observations of distance from home or frequency of adult presence must be considered separately for school occasions. To be able to control for the effect of the settings, the investigator has a choice between eliminating observation in settings which constrain the behavior of one group, or increasing the number of observations. Past studies have involved 10 to 47 observations per individual, spread over a three- to 12-week period. Although spot observations can be carried out accurately and efficiently by native observers (with even minimal education) using well-designed checklists, it is clear that these "instantaneous" observations involve some investment of time.

*Advantages of spot observations.* What advantages are provided by investing the time for spot observations, rather than by interviewing? Although many types of information can be obtained accurately simply by asking questions, other types are inaccessible to questions because the population does not notice or measure the variables of interest (e.g., amount of time that the child spends alone) or because there may be some motivation to distort the answer (e.g., frequency of school attendance; whether the child plays with children of the other sex).

Studies in the United States have produced considerable evidence that mothers' reports of their own or their children's behavior are inaccurate. Careful observations of child-rearing practices often give results uncorrelated with maternal report data (see Freeberg and Payne, 1967, pp. 75-76, for a review).

In my study of rural Mayan nine-year-olds, I obtained data which allowed a comparison of spot observations with maternal and child reports of children's participation in chores. Thirty spot observations were carried out over a three-month period on 60 nine-year-olds, with agreement of 98 percent between the two trained native observers. The mothers and children were interviewed regarding the children's participation in chores common to children of that age (for girls, washing clothes and dishes, caring for children, weaving, making tortillas; for boys, caring for children, gathering firewood, hoeing corn, and cultivating onions). Percent agreement between observations and reports showed substantial differences. Boy's reports of their own chores were in only

65 percent agreement with the chores they were observed to perform, and mothers of boys were in 66 percent agreement. Girl's reports were in 56 percent agreement with the observations of their chore participation, and their mothers were in 59 percent agreement.

Several biases could have influenced the reports. The mothers often stated that their children never work, "they just play all the time," occasionally adding a reprimand to the child for being disobedient. [Actually, boys were observed to be working on 39 percent of the (nonschool) occasions sampled, and girls on 57 percent of the occasions.] The children were eager to claim that they could perform adult activities, and exaggerated the number of chores in which they participated. Children's chores should have been the easiest of behavioral data to report accurately, because in most cases the mothers had assigned the chores, and the children, of course, performed them. That the percent agreements were so low attests to the usefulness of actually observing the behavior, rather than simply asking about it.

D'Andrade (1975) asserts that an individual's memory of an event is more closely related to the cultural expectations of "what goes with what" than with the actual event. He compared observations of small group interactions, ratings made immediately afterward by the participants of each other's behavior, and ratings made by the observer after the session, with independent judgments of similarity of meaning for each pair of social-behavior categories used in the observation and rating scale. The participants' ratings and the observer's ratings were similar to each other, and to cultural expectations as measured by the judgments of similarity of the social-behavior categories. Neither the participants' nor the observer's ratings, nor the semantic-similarity judgments were similar to the record of the event as observed. D'Andrade emphasizes the importance of not relying on reports from memory in the investigation of actual behavior.

How do spot observations compare with more extended observations? Spots have the advantages of being rapid, sampling many occasions, and diminishing the intrusive effect of the observer. They give accurate information as to the child's location, ongoing activity, and the people present. Investigators have used spot observations to obtain the following information: proportion of time that an infant is held and by whom (Kagan, et al., *ibid.*; Munroe and Munroe, 1971a, 1975); complexity of the child's routine activities (Munroe and Munroe, 1975); involvement in self-managed sequences of activity and voluntary social activities (Nerlove, et al., 1974); distance from home (Draper, 1975; Kagan, et al., *ibid.*; Munroe and Munroe, 1971b; Nerlove, et al., 1971; Rogoff, 1977; Whiting and Edwards, in preparation); and companionship and participation in chores

and play (Draper, 1975; Johnson, 1973; Kagan, et al., *ibid.*; Rogoff, 1977, 1978; Whiting and Edwards, *ibid.*).

*Disadvantages of spot observations.* Spot observations cannot provide some important information available in more extended observations. A useful analogy (thanks to M. Zaslow) is the difference in the information available from snapshots and that from movies. Neither spots nor snapshots provide information regarding the events leading up to the activity or why it is being performed, nor do they give much information as to the nature of interpersonal interactions. Extended observations of time or event sequences, like movies, give a detailed picture of the development of the situation observed. An interest in whether the child is leader or follower, or whether supervised or simply in the presence of an adult is best satisfied by an extended observation, rather than a spot-observation glance. [Note, however, that some investigators (e.g., Nerlove, et al., 1975) supplement spot observations with brief questions to arrive at some of this information.]

#### SPOT OBSERVATIONS OF CHILDREN'S ACTIVITIES AS PREDICTORS OF TEST PERFORMANCE

Spot observations were chosen as an economical and unobtrusive means of obtaining accurate information regarding the everyday activities of children. They had previously been used by several other researchers (e.g., Munroe and Munroe, 1975; Nerlove, et al., 1974) to obtain "unpackaged" independent variables for prediction of cognitive test performance. The present study (Rogoff, 1977) grew out of that background. It was expected that children who performed more complex chores, played rule games (as opposed to imitative or idle play), were farther from home, and were in the company of adults, rather than children, would show better performances on a battery of memory tests.

The 33 variables derived from the spot observations reflected the proportion of the total number of complete observations in which the child was observed to be in a particular activity or setting. They are as follows:

No one knows child's whereabouts; within a block of home; further than a block but within town limits; outside the town limits; with adult companion; older child companion; older female companion; older male companion; same-age child companion; female child companion; male child companion; younger child companion (other than a charge); charge as companion; no companion at all; any companion (other than a charge); playing rule game; playing casually; beach play; any simple play activities; idle; being taught; doing any kind of work (combining other categories); errand; washing and housework; child care; shucking corn or beans or cleaning onions; selling in store or

peddling; gathering firewood or fodder; agricultural work with corn or onions; weaving or sewing; making tortillas or other food; doing odd chores which do not fit other categories; doing any complex chore (combining other categories).

The memory tests given to the same 60 nine-year-old children were of visual recognition and recall (using scenes of toy models of familiar objects) and verbal recognition and recall (of Mayan prose). The tests were extensively piloted with the sample to be interesting, as well as to deal with familiar materials and processes, and administered by the author and a local woman in the Mayan dialect.

Simple correlations were calculated for each sex between each of the 33 activity variables and the four memory-test scores. Of the resulting 264 correlations, three would be expected to be significant at the .01 level by chance alone, and another 10 would be significant at the .05 level. In fact, there were only four significant correlations at the .01 level, and only 20 more at the .05 level. These few significant correlations were scattered randomly, rather than forming any pattern.

Nevertheless, nine of them were chosen on the basis of statistical promise or theoretical interest for analysis by multiple regression: whereabouts unknown; female child companion; male child companion; any companion (other than a charge); playing rule games; involved in simple play; doing any work activity; the child being taken care of as companion; and doing complex chores. This selection procedure is, of course, likely to *overestimate* the contribution of child's activity variables to prediction, since some would be chosen on the basis of statistics which meet the criterion due to chance variation. Two child-status variables, sex and age (there was a 17-month span in ages between the children), were included as controls. *None* of the regression equations including any combination of the nine selected child's activity variables (plus age and sex) approached significance, despite the bias in selection procedure.

Two of the nine variables did enter significantly into a few regression equations when a number of demographic variables were controlled statistically. Children often involved in child care performed better on the test of verbal recognition, once the effect of skill at school tasks (reading, writing, arithmetic, Spanish vocabulary) was controlled. Children who were commonly involved in simple play activities (casual play, goofing off, not rule games) performed more poorly on the verbal-recall test, once the effects of skill at school tasks and modernity of maternal occupation were controlled. These were the only two activity variables to show any significant prediction of memory scores, and each predicted only one of the four tests (rather than showing a consistent pattern), so it seems most reasonable to conclude that the

activity variables were not particularly predictive of the memory scores.

It may seem surprising that no relationship was found between routine activities and memory-test performance, inasmuch as the observations and tests were performed with such care. The simplest interpretation of this finding is that something other than memory "ability" takes priority in the assignment of everyday chores and activities. Some rather obvious family and ecological characteristics lend plausibility to this alternative. Participation in child care is determined largely by the presence of an infant in the family, and of other children to help care for the infant. Participation in agriculture is influenced by the distance of fields. A family with no fields needs no help working them, and a family with distant fields will wait until the child is older to take him on the long hike to the fields. Tortilla-making is less likely for the girl if she has older sisters to take care of the task. These examples illustrate selective factors which could overshadow cognitive ability in determining the activities of the children.

An explanation that still does not disrupt the framework of the endeavor is that if some other aspect of daily activities were measured (less concretely related to family structure and possessions), it might predict memory performance. Nerlove, et al. (1974) used spot observations to determine the extent of participation in self-managed sequences ("following an exacting series of sequences") and voluntary social activities, and related these inferential variables to the children's performance on tests of analytic ability and language facility. The five- to eight-year-old Guatemalan non-Indian children were observed 20 times each. The results showed that self-managed sequences were related positively to analytic ability, and voluntary social activities were related positively to language facility.

The discrepancy between the results of Nerlove and colleagues and those of the author may arise simply because memory is a cognitive skill more independent of the environment than are analytic ability and language facility. It may also be that the more inferential nature of the data of Nerlove, et al. (scoring "self-managed sequences" rather than the exact activity, for example) freed the observations from the constraints provided by family structure, which was discussed in a previous paragraph. However, when the memory scores of the present study were compared with the frequency of self-managed sequences (by scoring activities which Nerlove, et al. use to illustrate self-managed sequences), no improvement over the more concrete measures of children's activities was found. The difference may lie in Nerlove's classification of activities as self-managed sequences. Reliability measures were not performed on these codings (Nerlove, et al., 1974).

The third line of argument for explanation of the lack of relationship between routine activities and memory-test performance is that memory tests do not reflect the abilities necessary for the performance of everyday activities. Rather than searching for better observational measures of everyday activities, it is reasonable to conclude that tests may not be general measures of cognitive abilities, but only measures of cognitive performance in one specific situation. The children's everyday activities may well be related to their memory abilities, but not to their skill in memory tests.

Several authors have argued similarly that test skills may not generalize to everyday skills. Bronfenbrenner (1977, p. 513) suggests that "much of contemporary developmental psychology is the science of the strange behavior of children in strange situations with strange adults for the briefest possible periods of time." Cole, Sharp, and Lave (Cole, et al., 1976) point out that versions of most cognitive tests can be found in Binet's early attempts to predict success in French schools, and that we have no evidence that these skills are measures of ability that can be generalized beyond the test and school contexts. These arguments support the interpretation that memory-test scores and the observed everyday activities may be unrelated because test scores are not general measures of the skills required for (or practiced in) everyday activities.

The fourth explanation relates back to the assumption described at the beginning of this paper. Perhaps prediction of memory ability from environmental variables was unsuccessful because no such *thing* as general memory ability exists in varying quantities in different individuals. I should mention that, although a child's activities were not predictive of memory-test scores, I did find that maternal teaching style (use of verbal instruction versus demonstration) was highly predictive of the verbal (not the visual) memory-test scores. It may be that maternal teaching style relates to test-taking rather than to memory skills.

My study, as well as those of others, does not provide a resolution among the various explanations. However, I hope my discussion does point out several problems: children's activities are determined by many constraints in the family structure; there is insufficient theoretical guidance for determining what aspect of everyday activities might relate to test performance; there is no evidence that test performance is related to cognitive processes used in everyday activities; and there is an unsupported assumption that individuals "possess" variable amounts of cognitive power.

#### OTHER USES OF SPOT OBSERVATIONS

Despite the difficulties I have outlined, spot observations are useful in other contexts, such as in exami-

nation of the differences in the activities of children of different sexes, family backgrounds, and amounts of schooling.

A number of interesting sex differences appeared in the nine-year-old children's activities. (The comparisons which follow are all significant at  $p = .05$  or better.) Boys' whereabouts were more often unknown, and they were more often outside the town limits. Boys were more often in the company of adults and older children; girls were more often with charges or alone. Both boys and girls were found more with their own sex. Girls worked much more than boys; they did more errands, washing, child care, weaving, and food preparation. Boys did more gathering of firewood and fodder, and farming. A careful cross-cultural analysis of sex differences in children's activities, settings, and companions is currently under way (Whiting and Edwards, in preparation). It examines spot observations from eight cultures and social-interaction observations from 16 cultures.

The present study also found interesting relations among the activity variables, and between them and some family demographic variables. Those children who were often with companions were commonly playing rather than working, especially if the companions were boys, rather than girls. Those who played more often worked less frequently. Those who were often involved in child care were also frequently alone, and played less. There was a hint that modern families' children played more and worked less, and children of merchant mothers were involved in more complex chores. Children advanced in school (the range was kindergarten to third grade, although all were nine years old) appeared to perform complex chores more often.

The companionship of the nine-year-old children changed greatly depending on their location and activity (Rogoff, 1978). They were most likely to be with adults when at home or when far from town, and to be with children aged seven to eleven when about a block from home. Play activities were overwhelmingly in the presence of children, rather than adults. Work activities varied in the degree of adult and peer involvement. Generally, work done at home or far from home was more frequently with adult accompaniment, whereas work done in the neighborhood, but not at home, had little adult involvement but the same amount or more peer involvement.

A number of other studies have used spot observations to investigate the companions and activities of various populations (e.g., Draper, 1975; Johnson, 1973; Munroe and Munroe, 1971a; Whiting and Edwards, in preparation). Another area in which spots may be especially useful is in the study of changes of life styles as a result of modernization.

It is clear that spot observations can provide rich

information about the everyday social settings and activities of children and adults. The use of this information as predictor variables of cognitive test performance may be problematic; test performance may not be related to everyday skills, and there may be no such things as variation in amount of *ability* between individuals. But the spot-observation method *per se* is independent of this weakness. It is best used to measure the behavior of interest, rather than as an indicator of such nonobservable processes as cognition or motivation, unless there is a strong theory linking observations relevant to the process in question.

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## Adult Regulative Speech in Mother-Child Interaction

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In his writings, Vygotsky (1962; 1978; in preparation) emphasized that the ontogenetic history of psychological processes must be described as a progression in which "intrapyschological" functioning evolves from "interpsychological" functioning. That is, the ontogenetic progression of any psychological function begins characteristically with the child's dependence on interpersonal interaction, especially with adults, for the mediation and regulation of his actions. Children's self-regulative processes later emerge from the gradual internalization of these adult-regulative processes as they begin to mediate and regulate their own actions as agents independent of adult guidance.

Below, we will discuss different ways in which adult speech can be observed to regulate children's actions in adult-child interactions of a task-oriented (i.e., goal-directed) nature. More specifically, we will compare mothers' utterances to their children in terms of two major dimensions: the degree to which the mother relies on the child's understanding of the goal and strategy and the degree to which she uses nonverbal regulation. These dimensions will allow us to characterize how, during this kind of interaction, decision-making processes that regulate a problem-solving activity are controlled by the mother or have been transferred to the child. This, in turn, will give us a way to look at the process of transfer from inter- to intrapsychological control.

To illustrate this kind of analysis, I will use examples of adult speech that were collected from nine mother-child interactions in which a specific goal had to be reached. This was the completion of one truck

puzzle—"the copy"—to accordance with another, already assembled, puzzle—"the model." The task was specifically chosen so that it would be simple for the adults but difficult enough for the children (2½-, 3½-, and 4½-year-olds) to need adult guidance in various degrees. Mothers were simply asked to "help" their child put the puzzle together in any way they felt appropriate. With this definition of the situation, the over-all goal of the mothers was to get the child to place all the puzzle pieces in a copy in accordance with how they were arranged in the model. Given the nature of the task, a great deal of organizing and sequencing of actions was necessary in order to carry out the strategy involved in placing each puzzle piece correctly in the copy. Some of these steps were: looking at the model; identifying the next relevant color to work with; finding and picking up the relevant piece from the available pile; identifying the correct position in the copy; and placing the piece in the appropriate position (see also Vol. 2, #1, 1978, of *The Quarterly Newsletter*, pp. 15-18).

Most of the mothers' utterances were involved in monitoring the flow of the child's activity by somehow directing the child to carry out appropriate behaviors or sequences of behaviors at specific points during the problem-solving effort. From a functional point of view, we may characterize these utterances generally as "requests for action." Under this label, we include a wide range of syntactic forms, such as the following sample of four utterances:

- (1) "What color is this?" (pointing)
- (2) "Let's find the purple square."
- (3) "We need a purple square for up here." (pointing)
- (4) "I think it goes here, doesn't it?" (rising intonation and pointing)

Utterance (1) is a request for providing information about a specific reference; (2) is a request for performing a specific nonverbal action involving a referent. Similarly, (3) functions as a request for performing a specific nonverbal action and is different from (2) in that only the referent and its desired location are explicitly mentioned in the utterance, whereas the action(s) requested is presupposed (i.e., must be known or inferred by the child). Indeed, (3) immediately preceded (2) in our transcript and was followed by the child's picking up a piece (that was not of the requested color). Finally, (4) is what we might call a request for confirmation of a specific state of affairs. In our transcripts, however, it also functioned as a request for performing a nonverbal action involving a referent: (4) occurred as a child held a puzzle piece ("it") in her hand, wondering where to put it, and was followed by a correct placement of the piece in the copy.

As will become clear below, utterances such as these serve several functions simultaneously. The

functions we attribute to them depend on the very definition of this kind of interaction—that it is an asymmetric “teacher-pupil” situation, in which the mother regulates the child’s problem-solving activity (and in which the child’s inferential capacities may not always allow s/he to understand how the mother’s utterance relates to the task situation). Thus, when isolating the dimensions along which mothers’ utterances vary, we will need to distinguish, for example, the immediate effects of requests (e.g., identifying the color of a piece, placing a piece, etc.) and the effects that they have in the over-all context of the development of the child’s self-regulative processes throughout the interaction.

When making particular utterances at given points in discourse, mothers require (and thus presuppose) that children understand or are able to understand the task situation in various degrees. The first dimension along which mothers’ utterances vary is the degree of presupposed understanding which the child must have readily available in order to respond appropriately to a mother’s request. For example, we may illustrate this dimension by comparing the following requests:

- (5) “Now, what’s next?”
- (6) “Where does that go?” (pointing to a puzzle piece)
- (7) “What color is that?” (pointing to a puzzle piece)
- (8) “Do you see these pieces here?” (pointing to several puzzle pieces)

These utterances vary in the degree to which a response requires an understanding of the over-all goal of the task (i.e., to complete the copy in accordance with the model). To respond correctly to utterances (5) and (6), the child must understand that s/he has to look at the model in order to determine the next relevant piece, as in (5), or the correct position of a piece in the copy, as in (6). In contrast, minimal appropriate responses to utterances (7) and (8) do not require an understanding of the task goal. Rather, they simply require the child to look at the referent indicated by the mother in order to determine some characteristic about it, as in (7), or simply to have this referent in focal attention, as in (8).

We may label such utterances as (5) and (6) “goal-dependent,” and those such as (7) and (8) “goal-independent.” That is, goal-dependent utterances are those to which children can respond appropriately only if they can be relied upon to understand the nature of the task (especially the over-all goal), whereas goal-independent utterances don’t require such understanding. On the basis of this dimension, we can assess the degree of control taken on by the mother and look at the function these utterances may have. For example, goal-independent requests such as (8)—“Do you see these pieces here?”—usually

have the basic function of getting the child to focus on a particular aspect of the speech situation by establishing the existence of a referent which the mother views as relevant to the problem-solving effort and about which further discourse follows. In most cases of such “Do you see [referents]?” requests, the utterance was accompanied or followed by nonverbal interaction initiated by the child toward the referent (e.g., gazing at it, picking it up, pointing to it, etc.). Similarly, a goal-independent request such as (7)—“What color is that?”—may also have the function of getting the child to pay attention to a relevant aspect of the situation, such as color. They differ from “Do you see [referents]?” requests, in that their use already presupposes the existence of the object referred to, and they require the child to identify (verbally or nonverbally) some further characteristic about it. Obviously, the mother already has the information which she requests of the child. Uttering such requests serves to make the child focus on the requested information, which then becomes relevant for his following actions. Clearly, we can say that the mother, in making both kinds of goal-independent requests illustrated above, does not need to presuppose that the child understands at that point in the interaction what action or actions will be performed with that referent, or why an aspect of the situation, such as color, is relevant in relation to the task definition.

In contrast, the use of a goal-dependent request presupposes that the child knows about the existence of relevant referents, their relevant characteristics, and the relevant action(s) that must be performed with them as a means of fulfilling the mother’s request. Of course, the relevance of referents, characteristics, and actions in the situation cannot be defined independently of the over-all goal of the task. Correct responses to goal-dependent requests thus require much more self-regulation on the part of the child in carrying out appropriate actions independently of the mother’s guidance. This is especially true of utterances such as (5)—“Now what’s next?”—which seem simply to “punctuate” the child’s actions and keep him “on-task.” Nothing about (5) guides the child as to the nature of the problem-solving effort at that point, except for temporal adverbials such as “now” and “next,” which indicate that he has just completed a subgoal (usually the placement of one particular piece in the copy), and is about to set up the next subgoal. Most of the decision-making process about what particular action sequence to follow at that point in the interaction is in the hands of the child, and is not a function of any specific guidance on the mother’s part.

Note that when analyzing discourse, one cannot make general claims about the presuppositions that underlie utterance *types* (e.g., goal-dependent versus goal-independent) independently of the specific con-

text of discourse in which any utterance *token* is embedded. Thus, for example, a mother may (correctly or incorrectly) presuppose that her child knows what the goal and/or strategies are in the task and still will use one or more goal-independent requests at a particular point in discourse. As an illustration, consider the occurrence of the three requests underlined in the following exchange (exchange #1) between a mother and her 3½-year-old child:

- Mother: Okay, you want to do a black one. *Where does the black one go?*
- Child: Up here. (points correctly to the black piece in the model)
- M: Up there. *Which one is it on top of?*
- C: It's on top of white. (points to the white piece in the model)
- M: It's next to white.
- C: Yep.
- M: *Is it on top of orange?*
- C: Naaoo . . . yea.
- M: Right, okay, let me see you fit it up there.
- C: (places the black piece correctly in the copy)

The mother has begun by asking a goal-dependent request ("Where does the black one go?"), which is answered correctly by the child. At that point, both the mother and the child are looking at the model. The following two requests ("Which one is it on top of?" and "Is it on top of orange?") must be interpreted as goal-independent requests for information. The function of these two requests might be to "drill" the child to perform some of the subactions necessary in placing the piece in the copy, i.e., identifying the colors and positions of the piece adjacent to the black piece in the model. (Note that the orange piece, which was adjacent to the black piece, had just been placed in the copy.) This sequence is followed by a request for the placement of the piece in the copy (i.e., "Let me see you fit it up there"), to which the child responds correctly. Given that the child had correctly responded to the goal-dependent request "Where does the black one go?" it is not clear whether the next two goal-independent requests were necessary to guide correct placement in the copy or whether the child could have completed this particular subgoal independently. However, in the over-all context of the interaction, such requests can be viewed as providing the tools necessary to regulate the child's behavior at a later point during the problem-solving effort, where, for example, the child might immediately place the piece correctly in the copy (instead of simply pointing to the correct piece in the model) as a response to the mother's goal-dependent request.

Similarly, it often happened that mothers made goal-dependent requests to which they themselves immediately responded. In these cases, it is unclear whether the mother at first assumed too much understanding on the part of the child and then realized

that she would have to take back some of the control she originally had given, or whether she never really expected the child to be able to respond to such complex requests at all. In the latter case, she might be following the instructional strategy of asking goal-dependent (difficult) requests and providing the response herself. For example, consider the following exchange (exchange #2):

- Mother: Look on, look over here. (pointing to the general area of the model)  
*Where's the blue one go?* (points to the blue piece in the model)  
*Next to the yellow, right?* (rising intonation)
- Child: Yep. (places the blue piece correctly in the copy)

Here, the mother makes a request ("Where's the blue one go?") that we can characterize as goal-dependent, but to which she immediately provides the appropriate response, first by pointing to the appropriate position in the model and second by making another request (this time for confirmation: "Next to the yellow, right?"). The child then responds correctly both orally ("Yep") and nonorally (places the piece correctly in the copy). It seems that the child was responding to a combination of all three of the mother's actions and was led in this way to complete a subgoal in the task. As can be seen in such examples, one cannot analyze mothers' requests independently of the verbal and nonverbal context which precedes, accompanies, and follows them.

This brings us to the next dimension along which we wish to contrast mothers' utterances in these instructions: the extent to which mothers rely on nonverbal actions, especially on pointing gestures, in addition to (or often instead of) their verbal regulation. We found that mothers made extensive use of two kinds of nonverbal pointing. In the majority of cases, pointing was used with verbal demonstratives (such as "this one," "that," etc.) in order to refer either to a specific referent (specific pointing) or to a general area (e.g., the general area of the model or the copy) to which the mother wanted to direct the child's attention (general pointing). For example, specific versus general pointing are involved in (7) "What color is that?" (pointing to a specific puzzle piece); #2, "Look over here" (pointing to the general area of the model), respectively. From the videotapes, it is clear that mothers used verbal and nonverbal deictics such as these constantly to monitor the child's attention (e.g., gaze) to various aspects of the situation, whereas when no such deictics were used, mothers relied on the child's ability to respond to her requests strictly on the basis of their verbal regulation. Oftentimes the mothers alternated in using different kinds of nonverbal and/or verbal deictics versus not using them at all. For example, in the following exchange (exchange #3):



Mother: What's the next color? (pause) What's the next color on that truck? (pointing to the general area of the model)

Child: Orange.

The child is able to respond correctly to a goal-dependent request only after the mother uses a general point to regulate his attention. In other cases, the child's gaze follows the nonverbal pointing independently of the mother's verbal output, and is able to place a piece correctly on the basis of such nonverbal regulation.

The importance of this dimension in analyzing mothers' regulative speech must not be overlooked. Note that the use of a nonverbal deictic must be taken into account in categorizing requests as goal-dependent or goal-independent. Consider utterance (5)—"Now what's next?"—in the following cases: (5) is accompanied by a specific nonverbal pointing to the model (a particular piece); it is accompanied by a general pointing to the model; it is not accompanied by any pointing. In the third case, utterance (5) is clearly a goal-dependent request: the child can respond appropriately only if s/he understands the nature of the task. However, in the second and, especially, the first case, it is less clear whether (5) is a goal-dependent or a goal-independent request. An utterance such as (5)—"Now what's next?"—when accompanied by a specific point to the model, may be equivalent to an utterance such as (7)—"What color is that?"—since the child can respond with a color name (e.g., "the blue one") simply on the basis of pointing and the vague understanding that some identification is required by the request.

However, although utterance (5), accompanied by specific pointing, may be equivalent to (7) as far as what is required from the child *at that particular point* in order to respond correctly, we would suggest that these two kinds of utterances may have different effects on the child's performance *later in the problem-solving activity*. Because we are ultimately concerned with the over-all effects of the adult's regulation on the development of the child's self-regulative capacities, it is important to consider goal-dependence and nonverbal regulation when they interact in the adult regulative processes throughout the discourse. It is precisely by having to respond to goal-dependent requests which co-occur with actions that precede and follow them that the child is led to internalize the regulative processes with which he can plan his actions in a goal-directed manner independently of adult guidance. A child may be able to perform separately each one of the subactions inherent in a problem-solving activity (i.e., such as those regulated by the mother's goal-independent requests) and still not know how to proceed with the over-all task. Having to respond to various goal-dependent requests ultimately enables the child to plan and organize appropriately many of those subactions which, in

and of themselves, would not lead to the completion of the task. Thus, most of the goal-independent requests and responses and most of the nonverbal regulation provide the background against which goal-dependent requests become effective.

In order to provide some illustrative data to this claim, we need to look at some of the utterances and nonverbal actions made by the children in these interactions. Consider, for example, the following utterances (exchange #4):

Child: Where does this go, tha—orange next to the blue? (places the orange pieces correctly in the copy)

Mother: That's right, the orange goes next to the blue.

Here, it is significant that the child produces a goal-dependent utterance ("Where does this go?") similar to the goal-dependent requests typically used by the mother in order to guide the child's actions. The child then responds correctly to his own utterance both orally ("orange next to the blue") and nonorally (correct placement). These utterances are prototypical examples of "egocentric speech" (see Vygotsky, 1962). That is, they do not function in this context as communicative utterances; the child is not addressing a request to another interlocutor, but rather to himself in order to guide his own problem-solving activity.

These utterances are typical of the older children we observed (the 4½- and some of the 3½-year-olds). Note that the child's egocentric utterances illustrated in exchange #1 occur in the interaction a few utterances later than our illustration of a goal-dependent request made by the mother and immediately answered by her (exchange #2): "Where's the blue one go?" (specific point); "Next to the yellow, right?" It is clear that, even though the mother actually answers her own request, it is still a communicative utterance (i.e., a genuine request for action addressed to the child) to which the child responded. In contrast, the child's utterance does not serve a communicative function. Nevertheless, both the child's egocentric utterance and the mother's request are followed by a correct placement of a piece by the child, and the similarity between these utterances is striking.

In conclusion, we suggest that examples such as those provided above may give us a clue as to how the child's self-regulative processes emerge from an internalization of adult-regulative processes that occur during adult-child interaction. The two dimensions we selected to discuss here in order to compare mothers' utterances (i.e., goal-dependence and nonverbal regulation) are clearly not the only important characteristics of adult speech in adult-child interactions that are relevant to an analysis of adult-regulative processes. Isolating more of these dimensions would have clear implications for developing a

detailed analysis of how adult speech might be more or less effective in various instructional settings. More generally, the brief discussions in this paper are intended to suggest a new way to study the development of goal-directed psychological processes by placing the child in the context of interpersonal interactions where these psychological processes can be observed to emerge in the first place, i.e., when the child has not yet developed the ability to act as an independent agent.

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## Sociolinguistic Structure of Word Lists and Ethnic-Group Differences in Categorized Recall

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Performance in memory organization is commonly used as a signpost for intellectual development. Investigation of conceptual processes has often involved measuring the organization in recall of a verbally presented list of words in functionally and/or conceptually related categories. Free recall studies have frequently been cited by Jensen (1972; Jensen and Frederikson, 1973) in support of his theory of the differential distribution of higher-order conceptual skills among American subpopulations. In such studies, words belonging to distinct conceptual categories are presented in a random order, and subjects are asked to recall as many words as they can. The degree to which subjects reorder their recall to correspond with the predetermined conceptual structure of the list is taken as the measure of their underlying conceptual ability.

Because performance on word recall tasks is known to be a function of such variables as word familiarity, meaningfulness, and category cohesion (Tulving and Donaldson, 1972; Cofer, 1967), any conclusions about differential conceptual abilities of sample populations must rest on the assumption that the stimulus materials are equivalent on these parameters for the different populations studied. The present research questions this assumption. It proceeds

from the hypothesis that differential familiarity with words and categories present in a list interferes with list reorganization. By building differential familiarity of structure into the list, it should be possible to manipulate population differences in performance. This hypothesis was tested in studies in which list structure was systematically manipulated both across and within ethnic groups.

The first study compared recall performance of Black and White adolescents on a list in which half the categories were derived from standard norms commonly used in recall studies (designated as universal categories), and half were derived from elicitation procedures with Black adolescents (designated as Black categories). One hundred Black adolescents were interviewed in their neighborhoods. The five most frequent responses in the categories *drugs*, *dances*, and *soul food* were selected as members of the Black categories. These were combined with five words from standard norms (Battig and Montague, 1969) for the categories *tools*, *utensils*, and *clothing* resulting in a mixed list of 30 words (Note 1).

This list was presented for five successive trials in a standard free-recall experiment to 34 tenth- and eleventh-grade students, half of whom were White and half Black. White students attended a private high school in central Manhattan; Black students attended a storefront alternative high school for marginal performers in an impoverished neighborhood in Brooklyn.

Amount recalled by Black adolescents was greater than that by White adolescents, with a statistically significant difference occurring in the later trials (see Figure 1). Organization in recall was assessed by using a standardized score applied in previous studies (Jensen and Frederikson, 1973; Frankel and Cole, 1971). From this measure, the difference in ability to cluster the recall is greater for the Black adolescents. The significant Trials X Group Interaction indicates that this was a consistently progressive improvement in organizational ability.

It was hypothesized that the superior memory performance of the Black adolescents occurred because they were familiar with *both* the universal and the Black categories. In contrast, the White adolescents may have been familiar with specific words in the Black categories (*smoke*, *latin*) but not with their inclusion in an organized category (*drugs*, *dances*). To uncover the source of the Black-White differences, the lists were partitioned into sublists containing either Black or universal categories, which were analyzed by the same methods applied to the list as a whole. Table I contains the recall and organization scores for the two kinds of categories for Trial 5, on which group differences were most pronounced.

Although the degree of category organization is

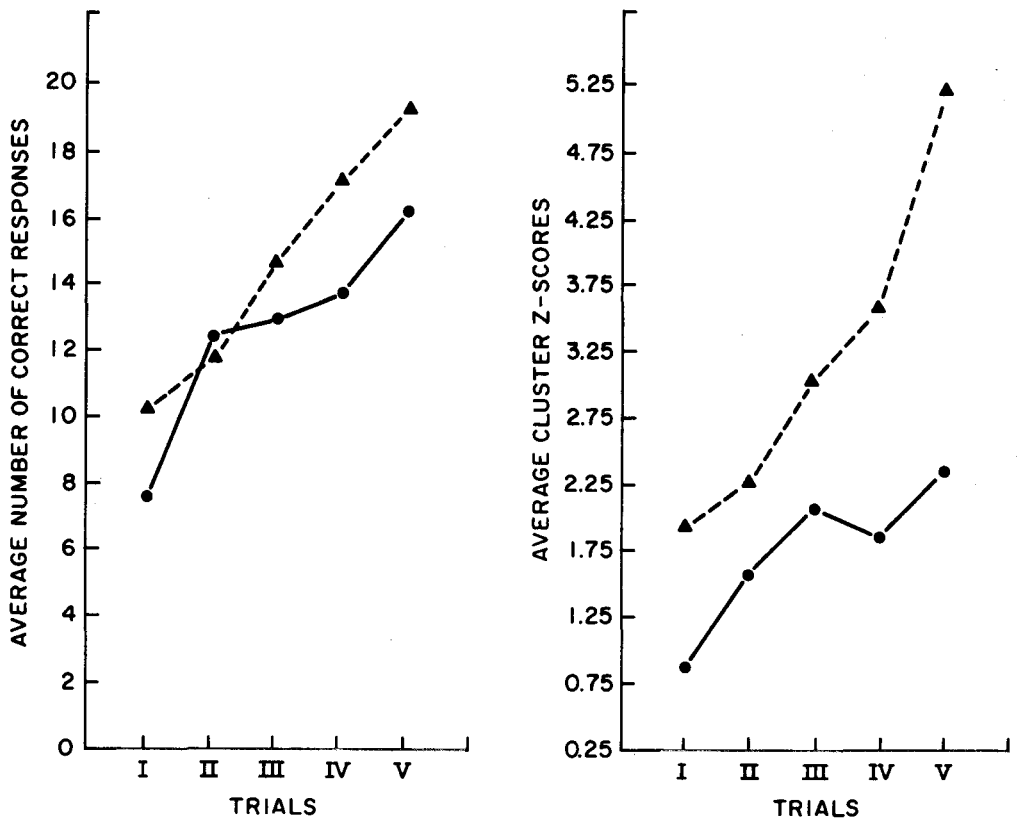


FIGURE 1. Average number recalled and cluster Z-score per trial.  $\blacktriangle$  = Black adolescents;  $\bullet$  = White adolescents

TABLE I  
Recall, Clustering, and Recall-Clustering  
Correlations by Subcategory; Trial 5

	<i>Black adolescents</i>			<i>White adolescents</i>		
	$\bar{X}$ Recall per category type	$\bar{Z}$	$r_{x,z}$	$\bar{X}$ Recall per category type	$\bar{Z}$	$r_{x,z}$
Black categories	9.94	1.93	0.83	8.65	0.29	0.08
Universal categories	9.35	1.50	0.89	7.50	0.57	0.70

greater for Black subjects on Black categories than on universal categories, the converse is true for White subjects. However, these differences between category types within each population are not statistically significant. Despite small numerical differences, there are no significant within-population differences in the amount recalled in the two kinds of categories. What does vary significantly within populations is the relationship between the amount recalled and the measure of category organization. The recall-organization correlation is high for both kinds of categories for Black students, but is high only for the universal items for White students. These results suggest that differential familiarity with the category membership of some items of a list affects performance on the list as a whole. If this hypothesis is correct, the presence of unfamiliar categories (or items that are perceived as difficult to assign to categories) converts a list that is considered completely organizable into a list which is treated by the subjects as only partially organizable. In effect, a mixed "categorizable-random" list was created, thus presenting an organizational task more difficult for the White subjects than for the Black subjects, for whom all the categories were familiar. Consequently, White subjects must treat segments of the list differently (i.e., as reflected in differing recall-organization correlations).

Another study was designed to test this hypothesis. In this study, part of the list was structured with items distinctly categorizable, and part with items difficult to categorize. Forty White, college-aged subjects were given a standard verbal recall test. Each subject was presented with a 30-item list of words for five trials of free recall, in which the same procedures and instructions as those in the previous study were employed. The composition of the list differed for the two basic experimental groups. In the "All-Clusterable" condition, subjects were read a list consisting of five items each from the categories *birds*, *professions*, *spices*, *weapons*, *geography*, *kitchen appliances* (Battig and Montague, 1969). In the "Mixed" condition, subjects were read a list consisting of three of the categories from the All-Clusterable list, and 15 items taken from the same source, except that each item was from a different conceptual category.

Table II presents responses to the three categories common to both the All-Clusterable and Mixed lists. The results show that the difference in list recall of these categories was not significant. Over-all recall is comparable to that observed in the first study. However, clustering for the three common categories in the All-Clusterable condition is more than twice as great as clustering for these categories in the Mixed condition. Finally, the correlation between clustering and recall is high in both groups, as anticipated from the clustering-recall correlation of the White

TABLE II  
Recall, Clustering, and Recall-Clustering Correlations for Categorizable Items in the All-Clusterable and Mixed Conditions

Group	$\bar{X}$ Recall for clusterable items	$\bar{Z}$	$r_{x,z}$
All-clusterable	8.6	1.53	0.82
Mixed	7.1	0.64	0.82

adolescents for universal categories in the first study. Although not shown in the Table, recall for the clusterable items in the Mixed list is slightly, but reliably, greater than recall of the nonclusterable items. These results were exactly those anticipated on the assumption that the Black categories in the first study functioned like random items for at least some of the White adolescents.

A continuing effort to study the effect of sociolinguistic history on memory organization has supplied additional supportive evidence to that reported here. One investigation was conducted in a racially heterogeneous high school among Black and White students with a common history of parochial-school training. Five different word lists were prepared from category exemplars provided by Black and White students. On one list, word categories from the Black-student norms were paired with those from the White-student norms, providing a Mixed condition; two homogeneous lists contained either all-Black or all-White exemplars from respective classification norms. Only universal categories were used on a fourth list, and a fifth list mixed universal with White exemplars. There were no over-all ethnic-group differences in performance, but general performance did vary by the type of list content and grade level. A closer examination of performance by individual subcategories was conducted to determine if previous trends were evident at this level of analysis. This required a comparison of subjects whose performance was on the same individual subcategories (e.g., Black singers, food, etc.). This procedure also allowed greater scrutiny of the effects on a single race-category type when the target words were part of either an all-Black list, all-White list, or a mixture of the two (Table III).

The data analysis revealed that when ethnic-group performance is examined at the subcategory level, the trend is supportive of the evidence in the previous studies. In comparing common subcategories, Black subjects recalled more on the Black normative subcategories than they did on the White subcategories. White subjects did just the opposite. Although Blacks recalled more than Whites on Black categories, this difference was not significant. There was

a significant difference in the greater recall of Whites on White categories than that of Blacks.

Interpretation of these results, I think, points out the difficulty in deciphering experimental performance in terms of the sociolinguistic development of different ethnic groups, particularly for the adolescent years. To speculate a little: from my observations, the social sharing between the various ethnic groups of this school is reflected in the word composition of some of the respective individual subcategories. When students in each ethnic group were asked to provide a listing of musical stars, they generated lists that differentiated popular Black stars from White ones. Understanding the recall performance in this category requires, in part, a recognition of the prominence of music in the lives of adolescents. Ethnic-group differences in musical preferences are diminishing among contemporary adolescents. Soul music and its stars frequently are featured on both popular-music stations and "all-Black" owned stations. The observed experience (and conversations) is that White adolescents, in their listening and social habits, are more likely to develop musical familiarity and preference within the combined category of soul and popular music than are the Black adolescents. In this instance, we have a highly shared category of experience in the direction of Black to White. This is evident when examining the lists made by White adolescents of musical stars, in which there is a greater incidence of naming prominent Black musical stars. Black adolescents tended to restrict their choices to Black stars. Considering the value of music in the lives of these adolescents, the "associative strength" of this category is probably high for both ethnic groups but the shared-familiarity edge tips more toward White students than Black. If this sharing applies to other categories of experience, it could account for a narrower difference between Black and White performance on Black categories than on White categories. The questions are: How many other conceptual categories have such pluralistic associations, and in what way does "context" mediate their order of priority? In present attempts to account for differential per-

formances between ethnic groups, there is little effort to determine the equivalence of socialization experiences and its specificity and/or (dis)continuity.

Further study is needed to discover the experiential attributes of words and category labels and how daily experiences affect this acquisition process. Heretofore, interest in memory organization paid insufficient attention to how performance is governed by the subject's sociolinguistic history (i.e., how the organization and use of language is affected by past social experiences). It is apparent that the level of an individual's mnemonic performance is directly related to one's experience with the content of the task. Words presented as stimuli in the study of memory vary in their episodic meaning. An identical word may, in the hierarchy of associations, mean something totally different to two groups with diverse sociolinguistic backgrounds. For example, "greens" to a suburban weekend golfer will be perceived in a different associative context than will "greens" to an urban Black family.

This does not mean that either a golfer or a Black cook could not comprehend the semantic contexts of each other. Frequency of word usage in a particular context obviously affects free-recall performance. The task is to discover the domain of associations common to a group. What makes this chore difficult in our society is the cultural pluralism and the pervasive dominance of the media. The sharing of intercultural associations breeds familiarity, but not necessarily dominance, in our storage systems. Therefore, it is easy to assume and expect that subcultural groups in this country have had comparable exposure and, hence, familiarity with the many conceptual contexts of words. Moreover, the acquisition and utilization of mnemonic information is not definitely understood. Consequently, variation in performance on recall tasks could be the result of a number of factors; conclusions about ethnic-group differences in mnemonic performance are, therefore, weakened further by lack of knowledge of sociolinguistic history and degree of intergroup assimilation.

Results of these studies are compatible with other current data and theory on recall and organization

TABLE III  
Total Correct Number Recalled by Common Subcategory  
Types and Race

Subcategory types	Black categories		White categories	
	All-Black list	Black-White Mixed list	Black-White Mixed list	All-White list
Black Ss	40.5	37.0	29.5	29.6
White Ss	39.3	29.3	33.3	44.1

that emphasize the necessity of matching the subject's verbal organization with that used in the task materials. We can conclude that the relevance of the Jensen studies to the differential distribution of specific types of learning abilities within various American subpopulations is minimal or nonexistent. The assumption that word-frequency counts and category norms taken from the White middle-class population correctly describe the relationship of these same materials to minority-group populations is gratuitous; when materials from such minority-group populations are used in the same way, the common line of inference would lead us to the conclusion that White students lack organizing ability.

Future studies of ethnic and social-class differences on conceptual ability in memory should specify more carefully the relationship between the organization of a group's lexicon and memory as measured in psychological experiments.

#### ACKNOWLEDGMENT

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#### NOTES

1. Black categories and items were: *drugs* (smoke, coke, ups, downs, acid); *dances* (bump, latin, grind, robot, truckin'); *food* (chicken, greens, cornbread, chittlins, ribs). Universal items and categories were: *tools* (drill, axe, saw, file, hammer); *utensils* (spoons, plate, cup, glass, pan); *clothing* (shirt, hat, socks, pants, shoes).

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## Concepts of Ecological Validity: Their Differing Implications for Comparative Cognitive Research

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The problem of differing observational techniques (experiments, interviews, natural observation) and the inferences they warrant is of particular concern to comparative, cognitive psychologists who have been concerned with individual and group differences in cognitive performance. Inferences about the source of such differences are generally of two types: (1) differences arising from the past history of the individuals under study, and (2) differences arising from the specifics of the experimental tasks. Because of the difficulty of getting tasks well defined enough to differentiate between the two inferred sources of variability across persons or groups, the use of experimental situations as the sole basis for inferences about cognitive abilities has to be considered suspect. But the alternative, natural observation outside of the laboratory, is just as problematic because it makes it difficult to specify in detail how people process information. Further, the *relations* between laboratory and nonlaboratory behavior are problematic. Here, we pursue one line of discussion bearing on the complex issue of ecological validity and representative design in psychological research.

A useful place to begin our analysis of the notions of ecological validity and representative design is the May, 1943, issue of *Psychological Review*, in which Egon Brunswik and Kurt Lewin, two scholars who figure centrally in the history of these concepts, contributed to a discussion of psychology and scientific method (see also Brunswik, 1957, and Lewin, 1935).

Brunswik's general aim was to develop procedures which would prevent psychology from being restricted to "narrow-spanning problems of artificially isolated proximal or peripheral technicalities . . . which are not representative of the larger patterns of life" (1943, p. 262). In order to avoid this problem, Brunswik suggested two closely related changes in the way psychologists should structure their observations:

1. Situations, or tasks, rather than people, should be considered the basic units of analysis; and
2. ". . . one would, secondly, have to insist on representative sampling of situations or tests. . . . For general adjustment this would mean a randomization of tasks, a sampling of tests carefully drawn from the universe of the requirements a person happens to face in his commerce with the physical and social environment" (p. 263).

As an example of such an approach, Brunswik made repeated observations on size constancy by an individual who was "interrupted frequently during her normal daily activities and asked to estimate the size of the object she just happened to be looking at" (p. 264). This person's size estimates correlated highly with actual measurements of the objects and not with their retinal image size. This result, Brunswik tells us, "possesses a certain generality with regard to normal life conditions" (p. 265).

This idea of sampling widely the environments within which a particular task is embedded to determine their effect on the responses of the organism has come down to us as a central tenet of "ecological psychology."

To make Brunswik's idea concrete, consider the operations which he offers for evaluating the ecological validity of size constancy in an everyday environment. First, he poses a problem for the subject (asks a question) which elicits a circumscribed response based upon limited aspects of the physical environment ("How big is that chair?"). Second, he has available a physical model of the stimulus elements that are critical to his analysis (a model of measurement which allows him to scale size of object, distance from subject, and, hence, physical size of image on retina). Third, he has a strong hypothesis which specifies relations between the physical stimulus and the subject's response—that either physical stimulus size (the "distal" stimulus) or stimulus size projected on the retina ("proximal" stimulus) will govern the subject's size-estimation response. Fourth, he obtains a very clear-cut result: correlation between reported size and physical size is essentially perfect, whereas the correlation with retinal size is poor. Of course, other settings could be investigated, and it might be possible to discover conditions in which the same result would not obtain. However, the logic of the enterprise is clear from the example; only the scope of the generalization is in question.

In our opinion, Brunswik's success was not accidentally related to the fact that the examples he actually worked out came from the area of visual perception, which represented (and represents) one of the most sophisticated areas of psychological theory. This gave him several advantages. First, because he could draw on the theory of physical measurement, he could confidently use a ruler to measure the dimensions of the objects whose sizes were being estimated, the distance from the subject to the object, and the size of the retinal image. In short, he could describe exactly the relevant aspects of the task environment and disregard such irrelevant aspects as the heat in the room, the color of the objects, etc.

Next, it is crucial that Brunswik was confident of the behavior that the subject would engage in when asked "How big is that \_\_\_\_\_?" He had strong

reason to believe that the question would focus the subject's attention on exactly those aspects of the environment which *he* thought relevant and which he could measure.

In addition, Brunswik could rely on competing hypotheses, derived from the laboratory, about how the crucial aspects of the environment mapped on to two aspects of the subject's response; he could specify the meaning of correlations with retinal or object size.

Finally, and crucially, he obtained essentially perfect prediction for *one* of the alternative hypotheses. Consider what kind of difficulties Brunswik would have faced had he been forced to proceed without any one of these resources for interpretation.

If he had obtained equivocal results with respect to constancy based on proximal or distal cues, he would have been in a quandary. He might have wanted to conclude that real-life perception depends upon a mix of distal and proximal cues; he might have pleaded that his subject was in some way atypical. He might have begun to worry about the efficacy of his question as a means of inducing the subject in a real-world environment to engage in the task which he had successfully posed in the laboratory.

At this point, it is useful to consider Kurt Lewin's contribution to the 1943 symposium on scientific method. On that occasion, Lewin argued his well-known position that behavior at time *t* is a function of the situation at time *t* only, and hence we must find ways to determine the properties of the situation "at a given time." To this statement, Lewin added his second major principle—that by situation, he was referring to the "life space" of the individual, "i.e., the person and the psychological environment as it exists for him" (1943, p. 306).

According to Brunswik, Lewin's approach left Lewin "encapsulated" inside the life space, cut off from observable responses on one side and measurable stimuli on the other. Lewin disagreed, saying that his goal was compatible with Brunswik's. He reformulated the overlap in their enterprises as one of "discovering what part of the physical or social world will determine, during a given period, the 'boundary zone' of the life space" (p. 309). Lewin dubbed this enterprise "psychological ecology." Granting its value, he saw his own work as centered on psychological dynamics *within* the "life space," rather than as an exploration of its boundary determinants.

If Kurt Lewin had been present and the difficulties we imagined for Brunswik's enterprise had arisen, Lewin might have suggested that Brunswik's questions to the woman about object sizes had changed the boundary of her life space, but not in the way Brunswik intended. Brunswik's questions may not have been appropriate to the life space of the person

he asked. In effect, Lewin would argue that, under such circumstances, there is a possible crucial mismatch between the geographical and psychological environments, such that Brunswik's physical measurements may not have been measuring the aspects of the environment that were a part of the subject's psychological environment.

Lewin would be almost certain to point out another feature of what Brunswik had done, or not done. Instead of observing the occurrence of someone making a size estimation in a real-life environment, he had made a size-estimation experiment happen in a nonlaboratory environment. He had, in Lewin's terminology, changed the subject's life space to fit the requirements of his predefined set of observation conditions. In light of later discussions of ecological validity in psychology and our own research, this distinction between sampling the occurrence of psychological tasks in different environments and sampling environments within which to engineer psychological tasks is crucial. It is a point which we have been slow to assimilate and one we think our colleagues have understood poorly.

Although there have been several recent discussions of the notions of ecological validity (c.f. especially Bronfenbrenner, 1979, in press), Brunswik's and Lewin's early discussion, focused as it was on issues in cognitive psychology, retains special relevance for current efforts to expand the generality of cognitive psychology. Precisely because the issues were formulated so clearly and so early, we are moved to ask what impediments have stood in the way of developing the experimental-theoretical program for a generalized cognitive psychology laid out by these pioneers. *Issues of theoretical fashion aside, we believe that the major difficulty arose because in practice, if not in theory, the requirement for representative sampling of cognitive tasks and the requirement for defining the "life space at a given moment" are in conflict with each other. Only under very narrow circumstances is it possible to accomplish both goals at once. Failure in either aspect of the enterprise can vitiate the other and, in general, psychologists have not been able to come up with procedures which would allow them to overcome the resulting ambiguities.*

Consider some modern versions of the call for ecologically valid psychological research. Neisser (who acknowledges that his use of the term differs from Brunswik's) tells us that the concept of ecological validity is important because it reminds psychologists that the artificiality of laboratory tasks may render the results irrelevant to the phenomena (implicitly, phenomena found outside the laboratory) that we really want to explain. He points to the "spatial, temporal, and intermodal continuities of real objects and events" as important aspects of normal

environments which are generally ignored in laboratory research (Neisser, 1976, p. 34). Barker (1968) had made a similar point. "Experimental procedures have revealed something about the laws of behavior, but they have not disclosed, nor can they disclose, how the variables of these laws are distributed across the types and conditions of man. . ." (pp. 1-2).

Bronfenbrenner (1976) has been especially influential in his insistence on the crucial role of ecological validity in modern psychological research, particularly in research on children that is purported to have public-policy relevance. In these discussions, he is even more insistent than Neisser or Barker that, in order to be ecologically valid, research must fulfill three conditions. First, it must maintain the integrity of the real-life situations it is designed to investigate. Second, it must be faithful to the larger social and cultural contexts from which the subjects come. Third, the analysis must be consistent with the participants' definition of the situation, by which he means that the experimental manipulations and outcomes must be shown to be "perceived by the participants in a manner consistent with the conceptual definitions explicit and implicit in the research design" (*Ibid*, p. 35).

In these discussions and a number of others (e.g., Brown and DeLoache, 1978; Cole and Scribner, 1975), the common assumption is that one can first identify some task of interest within a laboratory setting and then discover instances outside of the laboratory (in "real life") where these tasks occur, and thereby discover the extent to which the structure of tasks and behaviors in the laboratory are representative of the tasks and behaviors in other environments.

Note the crucial differences between these interpretations of ecological validity and the procedures proposed by Brunswik. Neisser, Bronfenbrenner, and the others cited do not propose that we carry around our laboratory task and make it happen in a lot of settings. They propose that we *discover* the way it occurs (or doesn't occur) in nonlaboratory settings. Moreover, in Bronfenbrenner's version of this enterprise, we must also discover the equivalent of Lewin's "life space," e.g., how the task and all it involves appear to the subject. These new requirements for establishing ecological validity place an enormous analytical burden on the psychologist who would fulfill them. That burden is perhaps more than psychology can, or psychologists would care to, take on.

Modern ideas about ecological validity place additional difficulties on cognitive psychologists who would practice it. As an illustration, we can point to a recent piece of ecologically valid research, in Brunswik's sense, and try to imagine what would be required to make it ecologically valid in Bronfenbrenner's sense.

In a study of memory, Koriat and Fischhoff (1974)



asked a large number of passersby on their university campus, "What day is today?" They measured the reaction time for answers to this simple question and found that it produced a bowed curve anchored by Saturday (the Sabbath day in Israel, where this study was conducted): reaction times were slower the further from Saturday the question was asked.

Except that no effort was made to catch people at many different points in their daily cycle, this study shares the features crucial to Brunswik's perception study. However, it should be clear that these observations do *not* match Neisser's or Bronfenbrenner's notion of ecological validity. We did not discover individuals being asked (or asking themselves) what day of the week it was. We did not observe their responses when they encountered the need to answer such a question without having the extra task of confronting a student with a "clearly revealed stopwatch." If we had encountered such a task as it arises *naturally* (e.g., in the course of activities which are not organized for assessing speed of memory retrieval), we might have observed the person consulting a friend or glancing at a calendar. It is also likely that we would find it very difficult to know if the question had occurred (e.g., in circumstances where the subject had posed the question to himself or herself in the course of figuring out if the children would come home late after school). These latter examples may appear frivolous, but they make the very important point that in order to "discover" cognitive tasks outside of the laboratory, we need criteria to indicate that they have occurred. In addition, we need to know as much as possible about the subject's responses to the task-as-posed, because this is crucial information for both Brunswik's and Bronfenbrenner's notions of ecological validity. There are no currently agreed-upon methods for accomplishing these goals. While several investigators, including ourselves, are engaged in creating the required methods, claims for the ecological validity of cognitive tasks should be treated as programmatic hopes for

the future. We have made little progress on this issue since Brunswik's and Lewin's discussion a generation ago.

#### ACKNOWLEDGMENT

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### APPLICATIONS OF PIAGETIAN THEORY TO EDUCATION

On May 18, 19, 20, 1978, the Jean Piaget Society will hold its eighth annual symposium of invited addresses, research papers, workshops, short courses, and exhibits. The theme is *Applications of Piagetian Theory to Education*. For more information write to:

Frank B. Murray, President  
221 Willard Hall  
University of Delaware  
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## ANNOTATED BIBLIOGRAPHIES

SPRADLEY, JAMES P., and MANN, BRENDA J. 1975. *The Cocktail Waitress*. New York: John Wiley and Sons.

The starting point for this study of woman's work in a man's world is the assumption that male and female roles are largely culturally determined. Society creates the special reality that is male and female. The special reality is created through role assignments. Cultures divide up the natural world. Culture is like a game-plan for living. In complex societies, the number of cultural perspectives for any situation increases radically. Regarding the role of women, culture has traditionally rendered them invisible in terms of any real power. The woman's role is essentially a passive one, particularly in decision-making. In *The Cocktail Waitress*, Spradley's and Mann's purpose is to show how cocktail waitresses exemplify woman's role as passive to men.

To support their argument, the authors selected for study Brady's Bar, located in a midwestern college town. To collect data they used three methods: (1) participant observation; (2) detached observation; and (3) interviews. Mann took a job as a cocktail waitress to accomplish the first method listed above. Spradley made frequent visits to Brady's as a male customer in the interest of method #2. Each cocktail waitress served as an informant. The waitresses informed the researchers about the social structure and the social network of Brady's Bar. Spradley and Mann also engaged in a debriefing process after each of Mann's sessions as a cocktail waitress.

Spradley and Mann make, in essence, three claims from their data. First, they claim that a cocktail waitress learns to *interpret* the language of the customer properly. For example, on one occasion, two men made the following utterance in response to a waitress' request for their drink order:

"Two double sloe screws on the rocks, uhhhh, for Joe and Bill."

In response to the above request, the waitress brought the customers two beers. We will not go into elaborate detail here about how the waitress knew to bring two beers. Suffice it to say that a key element in her interpreting the request correctly resides in the qualifier: ". . . for Joe and Bill."

Second, Spradley and Mann claim that a cocktail waitress must learn to *identify* people in the social structure. The over-all social structure at Brady's Bar is rather straightforward: customers, employees, and managers. The classes in the structure take on additional meaning, of course, through the social network. For example, customers become real regulars, regulars, female customers, and people off the street. The waitress must be able to locate each customer in terms of the social network.

Finally, the cocktail waitress must be able to *act* appropriately as a female. She must be primarily a sex symbol for men and a passive recipient of male dominance. Consequently, she must keep busy, submit to male teasing, run errands for men, and "card" only females, to name

a few of the behaviors Spradley and Mann observed at Brady's.

The authors present numerous examples of the aforementioned three categories of behavior being displayed by the cocktail waitresses under study. In every instance, the exemplar they present is an overt behavioral one, an utterance, a nonverbal gesture, etc., particularly as they relate to male-female dominance-submission interactions. It is difficult to argue for a "cognitive" interpretation of Spradley's and Mann's work, since the behaviors emitted by the cocktail waitresses ("femaleness") is so context-related. Spradley and Mann stake their claims primarily on woman's internalization of her role as submissive to men, and set about to show her displaying same. What they do not take into account (and future work must) is the *interaction* between internalized expectations for behaviors and context maintenance of those behaviors.

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MARKMAN, ELLEN M., and SIEBERT, J. 1976. Classes and collections: Internal organization and resulting holistic properties. *Cognitive Psychology*, 8: 561-577.

MARKMAN, E. 1973. Facilitation of part-whole comparisons by the use of the collective noun "family." *Child Development*, 44: 837-840.

Markman criticizes traditional views of the acquisition, use, and organization of concepts, and offers an additional model of concepts. Her criticism of the traditional views centers on their singular reliance on the class construct as a descriptive model. The author makes the point that concepts have both extensional (i.e., set of all instances) and intensional (i.e., defining criteria) aspects. Markman notes that a shortcoming of the class model is that many concepts do not possess clear-cut, definitive characteristics (the author cites "games" as an example). Another shortcoming mentioned is that the class model doesn't account for between-instance variability in goodness of fit among members comprising the set of a particular concept. According to Markman, these shortcomings warrant an additional model.

The author proposes that collections are a type of concept that has heretofore been ignored. Collections are distinguished from classes in three ways: collections do not have distinct intensional-extensional features; they have greater internal organization and form more natural units than do classes; and underlying collections is a part-whole relationship different from that found in classes. Collections and objects are also compared and discussed.

Markman theorizes that a developmental trend underlines the differences among objects, collections, and classes. Objects, collections, and classes are treated as a

continuum of concept types, one which may help to further explicate classification behavior in children. Specifically, it is proposed that the various stages of classification behavior that have been represented by Piaget and Bruner, for example, may reflect the child's movement from objects, to collections, to classes as a basis for classification.

To test the various hypotheses embodied in this framework, Markman uses the class-inclusion paradigm, with the additional features of children being asked part-whole questions concerning collections and objects. Thus far, the experiments have involved children from nursery-school to the fourth grade. The results have demonstrated that children have less difficulty conceptualizing collections than classes; however, as yet there is no strong evidence for a developmental trend.

One of the important aspects of this work is that it poses an additional basis for classification, one which may be more salient for children than for adults. Moreover, this work suggests that the salience of collections as a basis for classification in young children may obscure their ability to classify along other lines.

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BRUNER, J. S., JOLLY, A., and SYLVA, K. (Eds.). 1976. *Play—Its Role in Development and Evolution*. New York: Basic Books, 716 pp.

GARVEY, C. *Play*. 1977. Cambridge, Mass.: Harvard University Press, 133 pp.

Interpretations of play have been as ubiquitous and varied as the acts of play themselves, and serious observers of play may be found in nearly every literary and scientific discipline. Of course, the importance of play for cognitive development, creativity, cultural indoctrination, language development, and social bonding has been recognized for many years. But it is only in the last several decades that play has been the subject of intense scientific investigations, and these two volumes attest to this recent surge of interest.

What is play? And what is the function of play? These two questions have been the central foci of concern in the many discussions into the enigmatic character of play. The 71 essays in the book edited by Bruner, Jolly, and Sylva amply document the fact that neither of these queries can be answered simply. This handbook is a unique and superb collection of writings from scientists, poets, anthropologists, and others addressing the role of play in human life and in the course of human evolution. Many of these essays ponder the phylogeny of play as well as its adaptive functions.

Catherine Garvey's book, however, sets aside questions of "function" for the moment, and is more centrally concerned with providing detailed descriptions of the numerous aspects of play in human childhood. As justification for this approach, she cites Hughlings Jackson's dictum that "the study of the causes of things must be preceded by the study of the things caused." She reviews aspects of play involving different resources which form "classes of experience," such as play with objects, language, social materials, and rules of play themselves. In

her program, the central route to an understanding of play involves its definition by *extension* rather than *intension*, and a crucial first step toward understanding the function(s) of play lies in the elaboration and combination of forms of play into more complex play-episodes.

What becomes remarkably clear in a survey of these two books is the realization of an important parallel between the elaboration of rule-bound structures in play and in language during human development. This seductive isomorphism has led to recent work in developmental psychology, such as the research of Patricia Greenfield and collaborators, which argues for common organizing cognitive principles in these two task domains. As such, the claim for a cognitive basis to the structural isomorphism between action and language runs counter to Chomsky's hypothesis of cognitive capacities specific to language underlying universal grammar. What seems to be required to weigh these alternatives seriously is a cross-cultural approach to the study of the parallels between rule-governed play and rule-governed language. For we must consider the possibility that structural analogies between features of abilities in different task domains may wash out when viewed in cross-cultural perspective.

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BAHRICK, H. P., BAHRICK, P. O., and WITTLINGER, R. P. 1975. Fifty years of memory for names and faces: A cross-sectional approach. *Journal of Experimental Psychology: General*, 4: 54-75.

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Over the past few years, I have been collecting studies which examine recall after long delays. The articles under review are representative of the few studies which do exist. The salient point in each is that memories endure, even after years of neglect.

Titchner tried to get at the persistence of the memory trace by examining how easily he could relearn Milton's *Hymn on the Morning of Christ's Nativity*, a poem he had recited perfectly some 46 years before, at the age of 10. He recognized 11 out of 216 lines, but recited the whole poem with only one error after reading it through only 12 times. He cautions in his write-up that this remarkable performance may be because he was "accustomed to learning by heart," and not because of memory residue.

Both Warren and Smith took a more direct approach and examined recall after long delays, instead of relearning. Warren reported two case studies. D.T.W., his 90-year-old father, remembered perfectly a sing-songy poem, "Sam Patch's Leap," which he had recited to a

boy's club some 76 years previously. J.E.D., father of an "intimate friend," and the "oldest living alumnus of Dartmouth College," remembered, almost verbatim—after 69 years—his freshman oration while reminiscing about his college days. Smith reported on her ability to remember her Westminster Shorter Catechism, after a 20- and 40-year delay. Out of 107 questions, she answered 54 "perfectly" after 20 years and 53 after 40; with little prompting, 44 after 20 years, 39 after 40; and, with more prompting, 9 after 20 years, 25 after 40. For the remaining questions, she remembered at least a partial answer. These three case studies have two things in common. First, subjects remembered well-learned material after a very long delay. Second, each subject claimed that he had not thought about the material in the intervening years.

While case studies are interesting, there should be a way to study long, long-term memory without running impossibly long longitudinal studies. Bahrck, Bahrck, and Wittlinger do just this by conducting a cross-sectional study on memory for year-book pictures. Subjects, ranging from recent graduates to 50-year alumni, had to list the names of all of their former classmates that they could remember, recognize names and faces of classmates among foils, match names with pictures, and identify pictures. Recent graduates recognized about 90 percent of the names and faces, but this slowly declined to 75 percent after 50 years. Subjects generally had trouble naming a picture, going from 68 percent for recent graduates to 18 percent for the oldest alumni. The decline was very gradual and slow, however. Bahrck et al. suggested that subjects probably had overlearned their classmates' faces and names, and cited evidence from the verbal learning literature to support their claim that overlearning retards decay. Additional support for this hypothesis is found when interpersonal relationships are considered: no decay was found in either recall or recognition for classmates the subjects remembered as intimate friends.

Some of these articles might seem trivial, but they tell a very simple story whose moral is often missed. The remarkable feats of memory reported in each testify to the durability of memory: people can recall well-learned

material accurately even after 50 years of neglect. A curious person should want to explain this durability, but in trying to do so would discover that most theories of memory examine remembering in terms of forgetting. Interference theory, decay theory, and modern models of retrieval assume that a memory is laid down and then attempt to explain why it is not found during recall. The problem of describing the process of forming the trace (one which should not be confused with the process of encoding) is left to the psychologist. Surely, what is needed is a psychological model of this process. After all, the surprising thing is that people remember at all, not that they forget.

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